# BSTRACT

Objectives. This study assessed the quality of diabetes care in community health centers.

Methods. In 55 midwestern community health centers, we reviewed the charts of 2865 diabetic adults for American Diabetes Association measures of quality.

Results. On average, 70% of the patients in each community health center had measurements of glycosylated hemoglobin, 26% had dilated eye examinations, 66% had diet intervention, and 51% received foot care. The average glycosylated hemoglobin value per community health center was 8.6%. Practice guidelines were independently associated with higher quality of care.

Conclusions. Rates of adherence to process measures of quality were relatively low among community health centers, compared with the targets established by the American Diabetes Association. (Am J Public Health. 2000;90: 431-434)

# Quality of Diabetes Care in Community Health Centers

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Little research has studied the quality of diabetes management in the 800 community health centers that care for 10 million Americans in medically underserved areas. 1-4 Diabetes is a model illness for improving chronic disease management because it is common and expensive,5 and it causes much morbidity, 6,7 even though good care can prevent severe complications.<sup>8,9</sup> Clinics serving poor patients have special challenges that make it unlikely that research in more advantaged populations will be generalizable. 10 These health centers and their patients have fewer resources. The centers often lack access to integrated delivery systems, and their small size limits the financial feasibility of fulltime teams devoted solely to diabetes care. Therefore, our goals were to assess the quality of diabetes care in community health centers caring for vulnerable patients and to examine associations between organizational factors and the quality of care.

#### Methods

Study Population

Community health centers. The MidWest Clinicians' Network is a nonprofit organization of 70 community health centers serving indigent, vulnerable patients in 10 midwestern states. In 1995, MidWest Clinicians' Network clinicians identified diabetes as their priority condition for quality improvement. The MidWest Clinicians' Network established a research committee composed of clinicians, administrators, investigators from the University of Chicago, and representatives of the Bureau of Primary Health Care. The University of Chicago Institutional Review Board approved the study.

Patients. Each community health center was asked to randomly select up to 80 adults between 18 and 75 years of age with diabetes for the 1995 year. Pregnant women and patients with impaired glucose tolerance were excluded.

#### Data Collection

A trained abstractor at each community health center performed chart reviews with a standard instrument and code book. The chart review form included demographic information and various quality indicators based primarily on American Diabetes Association standards.11 The chart abstractors recorded whether the quality measures had been performed at any time in 1995. The project leader at each community health center also completed a survey about the community health center's organizational characteristics.

Statistical Analysis

The major unit of analysis was the individual community health center site. Thus, patients were nested within individual community health center sites. We analyzed descriptive statistics of community health center organizational characteristics, patient demographic characteristics, and the rates at which the process-of-care standards were met. The primary dependent variables of the quality of care were 4 major process measures (glycosylated hemoglobin measurement, dilated eye examination, diet intervention, and foot care or foot care education) and the absolute value of glycosylated hemoglobin. We used multivariable analyses to examine the association of practice guidelines, diabetic patient flowcharts, and diabetes patient education programs with these

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This brief was accepted October 15, 1999.

outcomes. We adjusted for both individual patient characteristics (age, sex, race/ethnicity, type 1 or 2 diabetes mellitus, insulin use) and site-level organizational characteristics (urban or rural setting, hospital affiliation) by fitting hierarchical regression models for multilevel data. 12,13 We also performed analyses stratified by urban vs rural location and size of the patient population.

#### Results

### Organizational Characteristics and Patient Demographics

The study sample included 55 sites and 2865 diabetic patients. Two thirds of the community health centers were rural, 41% used practice guidelines, 22% had implemented diabetes flowcharts, and 61% had a diabetes patient education program. On average, 52 diabetic patients from each site were surveyed; 65% were female, 30% were 65 years or older, and 71% were White. Twenty-five percent had Medicaid insurance, and 19% paid on a sliding scale. Thirty-six percent were taking insulin, and 61% were prescribed oral hypoglycemic agents.

#### *Quality of Care*

The community health centers met quality-of-care standards at relatively low rates compared with ideals (Table 1). 11 Of note, adherence to quality standards varied widely

TABLE 1—Quality of Care Rates<sup>a</sup>

Process of Care

across community health centers (Figure 1). Moreover, few community health centers performed uniformly well across the processof-care standards. Only 3 community health centers were among the top 25% in glycosylated hemoglobin measurement, dilated eye examinations, diet intervention, and foot care. Stratification of the quality-of-care analyses by geographic location or size of the patient population did not change the results.

#### *Independent Correlates of Quality Care*

Diabetes practice guidelines were independently associated with performance of hemoglobin A<sub>lc</sub> measurements (adjusted odds ratio [OR] = 2.79, 95% confidence interval [CI] = 1.32, 5.89, dilated eye examinations (OR = 2.09, 95% CI = 1.11, 3.93), diet intervention (OR = 2.32, 95% CI = 1.27, 4.24), and foot care (OR = 3.38, 95% CI = 1.12, 10.21). Diabetes flowcharts and patient education programs were not correlated with the quality of care measures. Guidelines, flowcharts, and education programs were not independently associated with the actual hemoglobin A<sub>lc</sub> values.

#### Discussion

Studies performed in diverse settings, including community health centers, consistently indicate that many physicians are not providing key processes of care to their pa-

% of Patients (±SD)

tients with diabetes. 3,4,14-22 The quality of care varied significantly across community health centers. Comparative benchmarking might help community health centers learn the best practices from other community health centers performing well for given quality measures.<sup>23</sup>

Few published reports of interventions to improve the quality of diabetes care in community health centers exist. Provider education is probably useful as a component of an intervention,<sup>24</sup> but it is usually insufficient alone.<sup>25</sup> An external expert consultative approach alone was not successful in New York City. 10 Barriers to success included community health center staff turnover, the difficulty of program implementation in clinics that already had major demands, and the need for intensive patient education.

Practice guidelines have improved diabetes care in general practices, 26 but a wider total quality management effort or chronic disease management approach may be necessary to enhance diabetes care in community health centers.<sup>27</sup> For example, O'Connor et al.<sup>28</sup> found that a continuous quality improvement initiative in the clinic of a staff model health maintenance organization lowered hemoglobin A<sub>1c</sub> values.

Study limitations include reliance on chart reviews for documentation of the process-of-care standards and the challenge of adequate case-mix adjustment. In addition, practice guidelines and flowcharts might be markers for more fundamental systems and cultures of quality improvement that lead to better care.

Diabetes care is complex because it involves both self-care by the patient and administration of key processes of care by the provider. Although patient education and improved training of physicians and nurses in behavioral change may improve self-care practices, our study suggests that practice guidelines and enhanced delivery systems for providers could increase the administration of key processes of diabetes care.

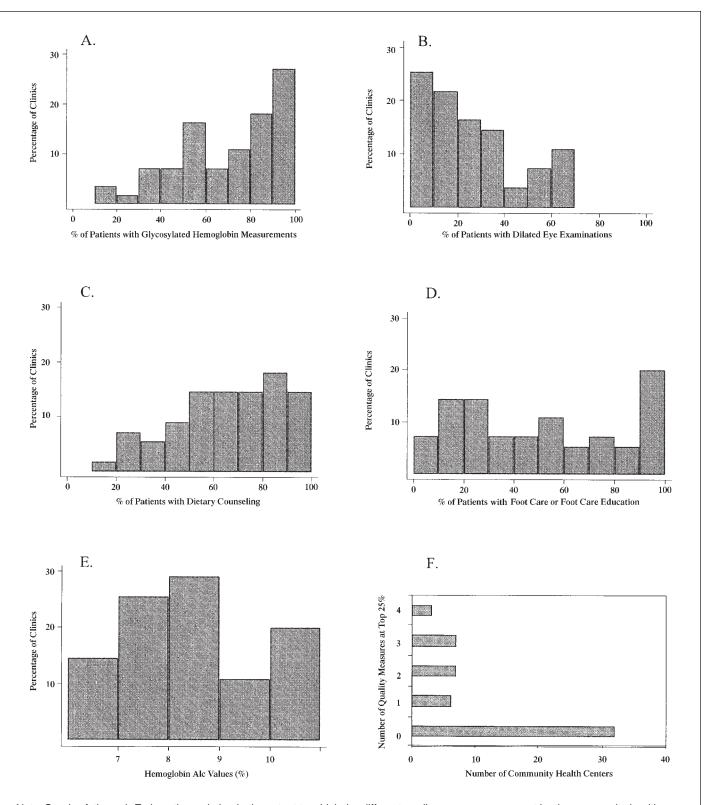
Glucose monitoring Hemoglobin $A_{1c}$ measurements	
0	30 (24)
1	43 (15)
≥2 Hemoglobia A. volus, maan I CD <sup>b</sup>	27 (22)
Hemoglobin A <sub>1c</sub> value, mean±SD <sup>b</sup> Hemoglobin A <sub>1c</sub> value ≤8% <sup>b</sup>	8.6 (1.6) 39 (17)
Home glucose monitoring	54 (20)
Eye care	34 (20)
Dilated eye examination	26 (20)
Diet, exercise, and education	- ( - /
Diet intervention prescribed or nutrition consultation	66 (22)
Exercise prescription	46 (29)
Diabetic education referral	48 (29)
Foot care	()
Complete foot examination or referral for self-foot care or podiatry	51 (32)
Vaccination	20 (17)
Influenza vaccine Dental care	32 (17)
Dental referral	7 (9)
Domai rolonai	, (5)

<sup>&</sup>lt;sup>a</sup>The community health center site is the unit of analysis.

## **Contributors**

M. H. Chin, principal investigator, oversaw all aspects of the study, including research design, development of instruments, data management, and data analysis, and was the primary author. S.B. Auerbach assisted in the initial design of the study and contributed to the analysis of the results. J. F. Harrison and J. Koppert were leaders in planning, organizing, and implementing the project and also participated in the data analysis. L. Jin did the computer programming and contributed to the statistical analysis and data management. T.G. Karrison oversaw the hierarchical modeling. S. Cook, F. Thiel, A. G. Harrand, C. T. Schaefer, H. T. Takashima, N. Egbert, S.-C. Chiu, and W.L. McNabb participated regularly in the overall study design, implementation of the project, and data analysis.

<sup>&</sup>lt;sup>b</sup>Among patients receiving hemoglobin A<sub>1c</sub> measurement.



Note. Graphs A through E show the variation in the extent to which the different quality measures were met by the community health centers. The horizontal axis separates adherence to the standards into deciles (or 5 categories for hemoglobin A<sub>1</sub>, value), and the vertical axis shows the percentage of clinics in each category. Dietary counseling = diet intervention or nutrition consultation; foot care or foot care education = complete foot examination or referral to podiatry or self-foot care education. Graph F shows the number of community health centers that were in the top 25% of the centers for the 4 process-of-care standards (glycosylated hemoglobin measurement, dilated eye examination, diet intervention, foot care). The vertical axis denotes the number of quality measures in which a community health center was in the top 25% of all centers, and the horizontal axis marks the number of centers in the given category.

FIGURE 1—Profiling/benchmarking quality-of-care indicators.

All authors contributed to the writing of the paper and are guarantors of the integrity of the research.

#### Acknowledgments

This study was supported by grants from the Agency for Health Care Policy and Research and the Bureau of Primary Health Care (CSH501328-11-3, CSH501328-12-2, CSH501328-13-3); the Centers for Disease Control and Prevention (CSH501328-13-2); and the National Institute of Diabetes and Digestive and Kidney Diseases Diabetes Research and Training Center (P60 DK20595). Dr Chin's work was supported by a National Institute on Aging Geriatric Academic Program Award (5-K12-AG-00488).

Presented in part at the annual meetings of the American Public Health Association, Washington, DC, November 17, 1998, the Society of General Internal Medicine, San Francisco, Calif, April 29, 1999, and the Midwest Society of General Internal Medicine, Chicago, Ill, September 17, 1999.

We acknowledge the dedication and collaboration of the 55 community health center sites participating in the MidWest Clinicians' Network diabetes quality improvement project: Rural Health, Inc (Dongola, Vienna, Anna), Anna, Ill; Frances Nelson Health Center, Champaign, Ill; Erie Family Health Center (West Town, Humboldt Park), Chicago, Ill; Claretian Medical Center (South Chicago, Roseland), Chicago, Ill; Henderson County Rural Health Center, Oquawka, Ill; Crusader Clinic, Rockford, Ill; ECHO Health Center, Evansville, Ind; Healthy Family Center, Mishawaka, Ind; Open Door/BMH Health Center, Muncie, Ind; Community Health Center, Hutchinson, Kan; Konza Prarie Community Health Center, Junction City, Kan; Health Care Access, Inc, Lawrence, Kan; Downriver Community Services, Inc, Algonac, Mich; Thunder Bay Community Health Center (Atlanta), Atlanta, Mich; East Jordan Family Health Center, East Jordan, Mich; Hamilton Family Health Center (Medical Clinic), Flint, Mich; Cherry Street Health Services, Grand Rapids, Mich; Thunder Bay Community Health Center (Hillman), Hillman, Mich; Northpoint Clinic, Houghton Lake, Mich; Houghton Lake Clinic, Houghton Lake, Mich; Family Health Center (Kalamazoo), Kalamazoo, Mich; Northern Menominee Health Center, Marquette, Mich; Ewen Medical Center, Marquette, Mich; Pullman Health Center, Pullman, Mich; Sparta Health Center, Sparta, Mich; Center for Migrant Health, Sparta, Mich; Sterling Area Health Center, Sterling, Mich; Family Medical Center of Michigan, Temperance; Northland Medical Clinic, Bigfork, Minn; Northeast Missouri Family Health Clinic, Edina, Mo; Samuel U. Rodgers Community Health Center, Kansas City, Mo; Family Health Care (McArthur, New Lexington, Chillicothe), Chillicothe, Ohio; West End Health Center, Cincinnati, Ohio; Community Health Services, Fremont, Ohio; Family Health of Darke County, Inc, Greenville, Ohio, Idaho Health Center (Idaho), Idaho, Ohio; Lisbon Community Health Center, Lisbon, Ohio; South Point Medical Center, South Point, Ohio; Family Health Center (Waverly), Waverly, Ohio; Kenosha Community Health Center, Kenosha, Wis; Nicolet Medical Center, Lakewood, Wis; Marshfield Clinic (Marshfield, Ladysmith, Park Falls), Marshfield, Wis; Sixteenth Street Community Health Center, Milwaukee, Wis; Milwaukee Health Services, Inc, Milwaukee, Wis; Rainbow Community Health Center, Milwaukee, Wis; North Woods Community Health Center (Minong, Hayward), Minong, Wis.

We also thank Peter D. Friedmann, MD, MPH, for his helpful review of the manuscript.

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